

HANDOUT



Program Title: Electronic and Instrumentation Facility: Site

Subject Title: Electronic and Instrumentation Objectives

FOR TRAINING USE ONLY

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OBJECTIVES

- 1.1 **DEFINE** the following terms:
- a. Conductor
 - b. Insulator
 - c. Resistor
 - d. Electron current flow
 - e. Conventional current flow
 - f. Direct current (DC)
 - g. Alternating current (AC)
 - h. Ideal source
 - i. Real source
- 1.2 **DESCRIBE** the following electrical parameters, including the unit of measurement and the relationship to other parameters.
- a. Voltage
 - b. Current
 - c. Resistance
 - d. Conductance
 - e. Power
 - f. Inductance
 - g. Capacitance
- 1.3 Given any two of the three component values of Ohm's Law, **DETERMINE** the unknown component value.
- 1.4 Given a standard electrical symbol, **IDENTIFY** the component that the symbol represents.

The symbols will be for the following components:

- | | |
|-----------------------|----------------------------------|
| a. Resistor | m. Fuse |
| b. Capacitor | n. Junction |
| c. Inductor | o. AC voltage source |
| d. Relay | p. Voltmeter |
| e. Contacts | q. Ammeter |
| f. Breaker | r. Wattmeter |
| g. Switch | s. Relay operated contacts |
| h. Transistor | t. Potential transformer |
| i. Rheostat | u. Current transformer |
| j. Diode | v. Wye (Y) connection |
| k. Ground connections | w. Delta (Δ) connection |
| l. Vacuum tube | x. Light bulb |
| y. Battery | |

- 1.5 Given a diagram, **IDENTIFY** it as one of the following types:
- Schematic diagram
 - One-line diagram
 - Block diagram
 - Wiring diagram
- 1.6 **DEFINE** the following terms:
- Resistivity
 - Temperature coefficient of resistance
 - Closed circuit
 - Open circuit
 - Short circuit
 - Series circuit
 - Parallel circuit
 - Equivalent resistance
- 1.7 Given a circuit, **DETERMINE** whether the circuit is an open circuit or a closed circuit.
- 1.8 Given a circuit, **CALCULATE** total resistance for a series or parallel circuit.
- 1.9 **DESCRIBE** what is meant by the term "voltage divider."
- 1.10 **DESCRIBE** what is meant by the term "current division."
- 1.11 **DESCRIBE** the difference between electron flow and conventional current flow.
- 1.12 Given a circuit showing current flows, **IDENTIFY** the polarity of the voltage drops in the circuit.
- 1.13 **STATE** Kirchhoff's voltage law.
- 1.14 **STATE** Kirchhoff's current law.
- 1.15 Given a circuit, **SOLVE** problems for voltage and current using Kirchhoff's laws.
- 1.16 Given a simple DC circuit, **DETERMINE** the equivalent resistance of series and parallel combinations of elements.
- 1.17 **DESCRIBE** the voltage and current effects of an open in a DC circuit.
- 1.18 **DESCRIBE** the voltage and current effects in a shorted DC circuit.

- 1.19 **STATE** the purpose of each of the following components of a DC machine:
- a. Armature
 - b. Rotor
 - c. Stator
 - d. Field
- 1.20 Using the left-hand rule of generators, **DETERMINE** the direction of the magnetic field, the motion of the conductor, or the direction of current induced into a conductor.
- 1.21. Given the value of resistance (R) and inductance (L) and a simple R-L series AC circuit, **CALCULATE** the impedance (Z) for that circuit.
- 1.22. Given a simple schematic of a circuit breaker control circuit, **DESCRIBE** the operation of that breaker during remote operation and automatic tripping.
- 1.23. **LIST** the three most widely-used protective features that may be incorporated into a circuit breaker control circuit.
- 1.24. Given a simplified drawing of a motor controller, **DESCRIBE** the operation of that motor controller.
- 1.25. **STATE** the purpose of circuit breakers.
- 1.26. **IDENTIFY** the principle of operation of the following types of level instrumentation:
- a. Gauge Glass
 - b. Ball Float
 - c. Chain Float
 - d. Conductivity Probe
 - e. Differential Pressure (ΔP)
- 1.27. **STATE** the three reason for using remote level indicators.
- 1.28. Given a basic block diagram of a differential pressure detector type level instrument, **STATE** the purpose of the following blocks:
- a. Differential pressure (D/P) transmitter
 - b. Amplifier
 - c. Indication
- 1.29. **EXPLAIN** how an RTD provides an output representative of the measured temperature.
- 1.30. **DESCRIBE** the two alternate methods of determining temperature when the normal temperature sensing devices are inoperable.

- 1.31. **DESCRIBE** the operation of a control loop diagram including the following components:
- a. Feedback element
 - b. Reference Point
 - c. Controlled output
 - d. Feedback signal
 - e. Manipulated variable
 - f. Disturbance
- 1.32. **Explain** how capacitance, resistance, and transportation time affect a control system.
- 1.33. **DEFINE** the following process control terms:
- a. Control system
 - b. Control system input
 - c. Control system output
 - d. Feedback
 - e. Controlled variable
 - f. Manipulated variable